WPA CO 7000 Colorimeter
User Manual

WPA

biochrom

Biochrom Ltd
Certificate No. 890333

Declaration of Conformity

This is to certify that the WPA CO 7000 Colorimeter
Part number 80-3000-42

manufactured by Biochrom Ltd. conform to the requirements of the following Directives-: 73/23/EEC & 89/336/EEC

Standards to which conformity is declared

EN 61 010-1: 2001
Safety requirements for electrical equipment for measurement, control and laboratory use.

EN 61326: 1998
Electrical equipment for measurement, control and laboratory use – EMC requirements

Signed: Dated: 24th November 2003

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Unpacking, Positioning and Installation

- Ensure your proposed installation site conforms to the environmental conditions for safe operation:
  Indoor use only, out of direct sunlight
  Temperature 5°C to 45°C
  Maximum relative humidity of 70 % up to 31°C decreasing linearly to 50 % at 40°C

If this equipment is used in a manner not specified or in environmental conditions not appropriate for safe operation, the protection provided by the equipment may be impaired and instrument warranty withdrawn.

- The instrument is powered by mains electricity using the supplied power-adapter. Using the instrument with the mains adapter will automatically recharge the internal rechargeable battery.
  - The battery will last approx. 1 month when fully charged with normal use.
  - A full battery recharge will take approx. 12 hours (overnight).

OPERATION

Introduction

Your colorimeter is a small, robust, easy to use instrument designed for use by doctors and medical technologists in small and medium sized clinics. The unit has been tropicalised to protect it in hot and humid conditions (to 45°C and 70%, respectively); the 10 gelatin filters are encased in glass to prevent fungal growths appearing and the PCB has been conformally coated so that individual components are sealed to prevent corrosion. The instrument is powered by an internal rechargeable NiMH battery or by external power allowing it to be used where the power supply could be unreliable.

Your instrument is very easy to use as there are only three buttons, and the wavelength required is selected by rotating an integral filter wheel. The filters are at 400, 440, 470, 490, 520, 550, 580, 590, 680 and 700nm enabling assays in the wavelength range 400 to 700 nm to be measured, and the instrument has been designed as an "open" system so that test kits for clinical and medical applications from virtually any supplier can be used. Examples of routine assays that can be measured in serum and plasma include Albumin, Cholesterol, Glucose, Creatinine, Total Protein, Urea and those in cerebrospinal fluid include Glucose and Total Protein*. The samples can be measured in either standard 10mm pathlength cuvettes (a minimum of 400µl is required) or in 10/12/16mm diameter test tubes (adapters are included with the instrument). There is a drain hole at the bottom of the cell compartment so that spillages do not affect the instrument.

Standard square 10mm light path cuvettes (including semi-micro cuvettes) are recommended for use. Plastic cuvettes serve well for water based chemicals, but glass ones are necessary for use with organic solvents. Finger marks or scratches can ruin results so be careful to handle square cuvettes by the non-optical (ribbed) sides only. Round tubes (10, 12 or 16mm diameter) may also be used and, being glass, are resistant to most solvents. Imperfections in glass tubes can lead to differences in Absorbance – one tube to another – so either ensure that the same tube is used for both the reference and the sample or for the most accurate work select tubes to match so that all give the same Absorbance when filled with identical solutions. Test tubes, used as cuvettes, should be marked so that they can always be placed in the same orientation. Fill cuvettes or tubes by pouring the solution slowly down the sides to avoid the production of bubbles.

* Recommended methods for these routine clinical chemistry assays together with full details of reagents required, manual colorimetric procedures, calibrations and quality assurance can be found in "District Laboratory Practice in Tropical Countries, Parts 1 & 2" by Monica Cheesbrough.

Using the Instrument

Keypad	
on/off	**On / off button**
R	**to set reference** to 0.000 OD at 600nm on a reference
T	to **make** a measurement
	Wavelength indicator
Display	There is a battery indicator

Note that the light beam shines from front to back through the cell chamber; ensure the cell is inserted in the correct alignment.

The following table indicates the absolute minimum volume necessary for the correct function of the unit. The use of disposable plastic cuvettes is recommended.

Cuvette/Tube	**Min Volume (ml)**	**Part number**	**Minimum Depth (approx) from base of cuvette to meniscus (mm)**
Macro Cuvette (max fill volume 4.5ml)	1.0ml	80-3000-60	14mm
Semi-micro (max fill volume 1.4ml)	0.5ml	80-3000-76	13mm
10mm diameter tube	0.9ml	-	16mm
12mm diameter tube	1.1ml	-	15mm
16mm diameter tube	2.2ml	-	15mm

Making a measurement

1. Switch the instrument on by pressing the ON/OFF button.
2. Select the required wavelength by turning the thumbwheel at the side of the instrument. The wavelength selected is displayed in the window above the cuvette compartment.
3. Place a reference into the cuvette compartment and press and release the R (reference) button. The display will show 0.00 Abs.
4. Remove the reference sample and replace with the sample solution in a cuvette or tube.
5. Press and release the T (test) button. The result is displayed in absorbance units.

Multiple samples can be compared with the same reference by placing different samples in the cuvette chamber and making measurements for each one. It is recommended to re-reference with the reference solution every 10 to 15 minutes to avoid any slow instrument drift. If in doubt, always re-reference.

Note: At high Absorbances the time taken to take a measurement will be longer (up to 10 seconds) as the light levels are proportionally lower.

TROUBLE SHOOTING NOTES

ERROR INDICATION	SOLUTION
A flashing Absorbance reading of 2.00 A is obtained.	This indicates an Absorbance of more than 1.99 and which is therefore out of range. The sample needs to be diluted.
A negative reading is obtained.	In normal measurements the test sample has a positive Absorbance compared to that of the Reference. Occasionally it can happen that the chemistry has been arranged for a coloured Reference and a less absorbing test solution, i.e. one of negative Absorbance. The instrument will respond correctly to negative absorbances down to –0.30 A. Negative readings will also be obtained if the Reference and Test cuvettes are mixed up.
A flashing Absorbance reading of –0.30 Abs is obtained.	This indicates an Absorbance of less than –0.30 Abs and is therefore out of range. The sample needs to be diluted.
Unexpected results are obtained	Any bubbles in solution will produce considerable error. Check bulb is flashing
rEF is displayed when T is pressed	The baseline has not been set. Replace the sample with a blank or reference sample and press R. The samples can then be tested.
No reading is obtained when using the instrument is being operated by battery.	Check that there is sufficient battery power available. The battery power available is indicted by the battery symbol at the bottom right hand corner of the display. Three bars in the battery indicate that it is fully charged. If only one or no bars are present the battery needs to be recharged. Connect the instrument to the electric power supply using the adaptor/recharge unit. The battery will be recharged in 12 hours.
An abnormally high absorbance reading is obtained at one wavelength	Visually check the sample to ensure that there has been no errors in the chemistry performed. Check the condition of the filter. Deterioration of the filter could cause higher absorbance readings.

IMPORTANT WARNING

- This colorimeter has been designed for non toxic water based solutions. If stronger solutions or dangerous or aggressive chemicals have to be used then they must be treated with great care and be contained in properly stoppered glass cuvettes.
- Never cover the end of a cuvette by the thumb or finger to shake the contents.
- Never pipette by mouth.

ACCESSORIES, CONSUMABLES AND SPARES

Pack of 100 disposable cells, 1ml minimum volume	80-3000-60
Pack of 100 disposable cells, 0.5ml minimum volume	80-3000-76
Adapter set for 10 and 12mm tubes	80-3000-57
Spare filter set	80-3000-56
Spare lamp	80-3000-55

MAINTENANCE

General maintenance

The instrument has no serviceable parts.
The instrument requires little maintenance. The following are considered good practice:

1. Always disconnect from the mains supply when not in use.
2. Keep the instrument clean and dry immediately wipe off any spilt liquids. Clean with a slightly damp cloth; a non-abrasive water-based soap or detergent may be used.
3. Replace the dust cover when not in use.
4. Remove the cuvettes from the instrument when not in use.
5. At regular intervals check the mains power adaptor and cable for wear and tear and replace if damaged.
6. Store in a cool place away from corrosive chemicals or fumes.

Changing a filter

Ultimately the filters may need replacement depending on the environment. High humidity will cause the filters to fail more rapidly. If a filter does have to be replaced, replace the whole set (part number 80-3000-56):

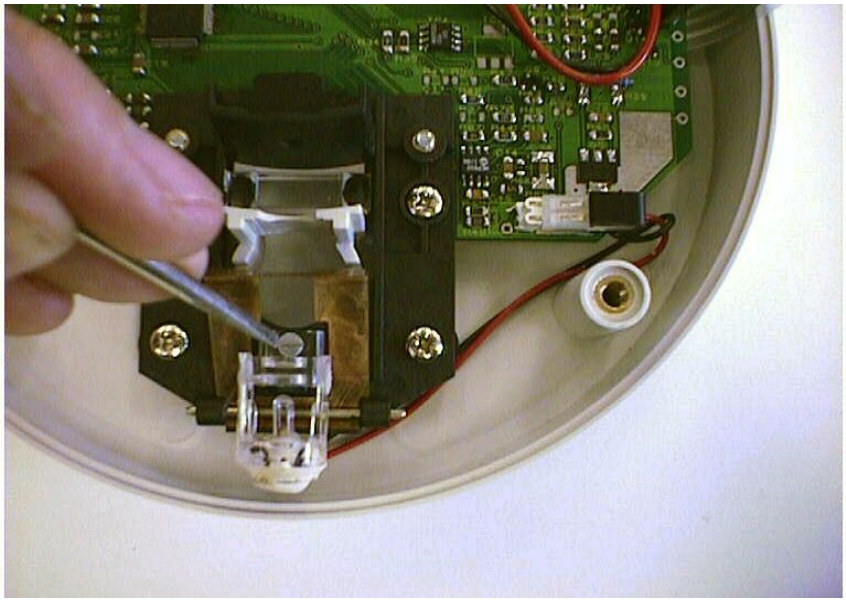
1. Disconnect from power supply.
2. Place the instrument upside down on a soft surface and unscrew the large grey screw at the centre of the filter wheel. The filter wheel can then be removed.
3. Remove the filter to be replaced by pushing the locating clip back on the underside of the filter wheel whilst pulling on the filter (a large flat head screwdriver may help).
4. Insert a new filter ensuring that it clicks firmly into place.

5. Replace the filter wheel and tighten the screw finger tight.

Replacing the light bulb

1. Disconnect from power supply
2. Place the instrument upside down on a soft surface and remove the 4 screws in the base using a No 1 Pozidrive cross head screwdriver.

3. Remove the lamp assembly fixing screw with a small flat screwdriver and unplug.
4. Insert the new lamp assembly (part number 80-3000-55) and tighten the fixing



screw.

5. Replace the base of the instrument and tighten the 4 base plate screws.

SPECIFICATION AND WARRANTY

Wavelength range	400 – 700nm
Gelatin filters mounted in glass	400, 440, 470, 490, 520, 550, 580, 590, 680, 700nm
Bandwidth	40nm
Range	Absorbance –0.3A to 1.99A % Transmission – 0 to 199% T
Accuracy	<±0.05A at 1A using Neutral Density Filters
Repeatability	±0.02A at 1A using cuvettes
Operational modes	On/off, reference, test
Cuvette holder	Fixed with drain hole. Accepts 10mm pathlength semi micro and macro cuvettes or 16mm round tubes. Can accept 10 and 12mm tubes with adapters supplied
Power requirements	External power adaptor (110 to 220V, 50/60Hz, 20VA) or internal rechargeable NiMH battery
Approximate dimensions	180 x 150 x 60mm
Weight	0.6kg

Specifications are measured after the instrument has warmed up at a constant ambient temperature and are typical of a production unit. As part of our policy of continuous development, we reserve the right to alter specifications without notice. The product does not fulfil the specific requirements of the IVD.

Warranty

Your supplier guarantees that the product supplied has been thoroughly tested to ensure that it meets its published specification. The warranty included in the conditions of supply is valid for 12 months only if the product has been used according to the instructions supplied. They can accept no liability for loss or damage, however caused, arising from the faulty or incorrect use of this product. This product has been designed and manufactured by Biochrom Ltd, 22 Cambridge Science Park, Milton Road, Cambridge CB4 0FJ, UK.